

## **STATE OF THE WATERSHED REPORT CACHE CREEK SUB-WATERSHED**

### **Watershed Description**

Cache Creek watershed drains 1,150 square miles on the eastern slope of the northern part of the California Coast ranges in Lake, Colusa, and Yolo Counties. The watershed extends from the tributaries of Clear Lake to the Yolo Bypass, 10 miles northwest of Sacramento. There are three main tributaries: the South Fork of Cache Creek including the Clear Lake drainage, the North Fork of Cache Creek including Indian Valley Reservoir and Bear Creek.

### **Water Quality Assessment**

The most significant water quality problems in Clear Lake are nutrients and mercury. Nutrients entering the lake cause nuisance algal blooms. There is a fish consumption advisory recommending limited human consumption of fish from the lake because of elevated levels of mercury in fish. The main source of mercury deposited in lakebed sediments and continuing to enter the lake is the Sulfur Bank Mercury Mine. Lesser amounts of mercury enter via tributary streams from erosion and geothermal activity at natural mercury deposits. Sulfur Bank Mine is a Federal Superfund site.

Downstream of Clear Lake and Indian Valley Reservoir and in the Bear Creek drainage, there are numerous inactive mercury mines that have localized impacts on adjacent waterways and cumulatively contribute to downstream problems. Fish from lower Cache Creek have elevated mercury levels. During periods of high runoff, large loads of mercury come down Cache Creek and enter the Yolo Bypass. Smaller amounts of mercury are also released into the Yolo Bypass during low summer flows. Mercury from the Cache Creek Watershed appears to be a major source of mercury entering the Delta.

Gravel mining operations in Cache Creek, between the foothills and Yolo Bypass, have caused concern to local citizens. They are concerned that the operations will enhance the transport of pollutants to drinking water wells that are adjacent to Cache Creek. They also believe that the operations have reduced infiltration rates. There are erosion problems downstream from gravel extraction operations. Erosion problems are experienced throughout the watershed and have resulted in substantial property damage, including at a Yolo County park, loss of productive farmland, damage to roads and bridges, and increased risk of flooding at private homes. Gravel removal may remobilize mercury previously deposited with sediment.

Gravel mining within the active channel of Cache Creek has been eliminated. Gravel extraction for flood control purposes is still permitted. Mining has been relocated to adjoining terraces and is being monitored. Yolo County reports that no significant water quality problems to Cache Creek have been detected. There is still some concern

expressed by private citizens about potential problems in the off-site pits that are created during mining operations and potential threats to ground water.

Elevated boron levels downstream from the confluence of Bear Creek can impact agricultural production and may inhibit efforts at reestablishing riparian vegetation.

Comprehensive monitoring studies have not been completed in the watershed to determine whether pesticides are a problem in the watershed. Tests conducted by Yolo County during the 1997-98 winter season did not detect any pesticides or herbicides, however, further testing is recommended. There is the potential for pesticide problems in portions of the watershed that are dominated by agricultural activities. Yolo County testing did show high total and fecal coliform levels in the lower watershed.

Cache Creek is on the Clean Water Act Section 303(d) List (water bodies where objectives are not being met even after application of Best Available Treatment/ Best Control Technology) because of mercury and toxicity to aquatic organisms. Causes of the aquatic organism toxicity are unknown. Clear Lake is listed because of mercury and nutrients.

### **Current Activities and Strategy to Address Problems**

The following ongoing and proposed activities in the Cache Creek watershed will include a considerable amount of stakeholder involvement. Regional Board staff will be completing technical TMDLs for Clear Lake by June 2001, for Cache Creek by June 2002 and the Delta by June 2003. Stakeholder input will be sought during development of the major TMDL elements (sources, estimation of mass loads, water quality target, and load allocations) and the implementation plans developed for Basin Plan Amendments. Regional Board staff will work primarily with stakeholders in existing local watershed groups. Additional meetings for the general public will be held as necessary. Resources for both Regional Board staff time and for contracts are required to complete the TMDLs.

Mercury monitoring programs are being conducted by the US Fish and Wildlife Service, US Geological Survey, California Department of Fish and Game, Homestake Mining Corporation, UC Davis, Yolo County, Sacramento River Watershed Program and the Regional Water Quality Control Board. Regional Board staff will continue to coordinate its monitoring programs with existing efforts by local, state and federal agencies.

Important components of stakeholder involvement are education and citizens monitoring networks. Staff will work with interested parties in the watershed to develop monitoring programs conducted by local groups and school programs. Such parties include the Cache Creek Stakeholders Group, the Cache Creek Conservancy, the Yolo County Flood Control and Water Conservation District, and the Rumsey Water Users Group. The responsibilities of the Colorado Center for Environmental Management to assist in organizing an active stakeholder based program for addressing water quality problems in the watershed has been assumed by AGEISS.

There are various educational and/or stream rehabilitation efforts underway in the watershed, including programs by Yolo County, the Cache Creek Conservancy, the US Army Corps of Engineers, Project Hawk, the Putah/Cache Bioregion Project, CALFED, and individual land owners. In addition, a Clean Water Act Section 205(j) grant has been approved to begin to address toxicity concerns in the watershed. In FY 97-98, Regional Board staff provided support for these efforts by cooperatively developing informational packets and sponsoring issue-oriented forums. These support efforts will continue for the next few years. Additional staff effort is needed to streamline the existing permit process in order to better facilitate stream restoration efforts.

### Clear Lake

Lake County has formed a Comprehensive Resource Management Program group to address the algal problem. Efforts have focused on reducing the levels of nutrients entering Clear Lake. Various projects have been implemented to reduce sediment loads to the lake, including some supported by EPA and State Board nonpoint source grants. Lake County submitted a State Board Proposition 204 grant to work on a wetlands project on Middle Creek. The Lake County Public Works Department and the Clear Lake Advisory Subcommittee anticipates releasing a final draft version of a Clear Lake Management Plan in December 1999. The Management Plan will present analysis and implementation options for water quality and ecosystem issues, including mercury, algae, aquatic weeds, erosion, wetlands, surface and groundwater quality, MTBE, forestry management and fisheries. Regional Board staff resources are needed to support these and other watershed efforts.

### Cache Creek

Yolo County has implemented a Cache Creek Area Plan to manage riparian resources in the lower watershed, below Capay. The plan focuses on restoring habitat, reducing erosion, maintaining flood capacity, and improving water quality. The County works closely with the Cache Creek Conservancy and both groups have actively participated in the Cache Creek Stakeholders Group. Toxicity and water quality monitoring are being implemented using State Board grant funds. Regional Board staff needs to continue to support this effort and continue to provide oversight on ongoing grants.

One of the goals of the Cache Creek Area Plan is to coordinate local, state, and federal regulation of activities within Cache Creek. Regional, programmatic permits have been obtained by the County from the US Army Corps of Engineers and the Department of Fish and Game for the plan area. Landowners who wish to work within the active channel must obtain a permit from the County, which includes the conditions required under the regional programmatic permits. This has significantly reduced processing time and costs from the applicant, while also providing a unified, interagency approach to riparian resource management. Additional staff resources are needed to work with the County to try to integrate the Regional Board process in a manner that builds upon, and

coordinates with, the existing established programmatic approach that is working in the lower Cache Creek area.

The Cache Creek Watershed Stakeholders Group was initiated in October 1996 after the complex mercury problem in Cache Creek was identified as an issue that may best be addressed through a collaborative watershed approach. The Colorado Center for Environmental Management, an independent, non-profit organization created in 1991 to find better solutions to environmental problems, and the Regional Board worked with local stakeholder and other agencies to initiate this stakeholder driven process to address water quality problems in the watershed and coordinate activities. The group has agreed to the mission of “bringing together all interested parties in a collaborative process to enhance watershed resources by creating opportunities for education and implementation”. Issues of interest to the Cache Creek Stakeholders Group have expanded beyond mercury to include gravel mining impacts, invasive species, erosion control, flood protection, riparian restoration and permitting processes. In addition to participating individually, some local landowners are participating in the Stakeholders group through the recently-organized Capay Valley Water Users Association. The Stakeholders Group is considering development of a watershed management plan for Cache Creek, likely for the region between Clear Lake and the town of Rumsey.

The Cache Creek Stakeholders Group has established issue working groups to work on mercury, non-native plant species control programs and upland erosion. The Cache Creek Stakeholders Group established a steering committee to facilitate communication between the work groups and to help guide the activities of the full watershed group. The Stakeholders Group, working with Yolo County, received State Board Proposition 204 funding for stream restoration work in the lower watershed for fiscal year 1999-2000 with an extension for fiscal year 2000-2001. The upland erosion group is exploring options in cooperation with Natural Resources Conservation Service. Activities of the mercury workgroup are described in the next section.

In Fall 1998, Yolo County accepted a 130 acre site on Cache Creek near Woodland for creation of the Cache Creek Nature Preserve. Initial wetlands restoration and trail construction are being funded by a grant from Proposition 204 funds and the State Wildlife Conservation Board. Goals for the Preserve are to provide a variety of riparian habitat types for wildlife and educational opportunities, particularly for children.

### Mercury

Some abatement work has been completed at Sulfur Bank Mine. US EPA continues to evaluate additional cleanup options. A Superfund site Remedial Investigations Report is slated for release in Fall 2000 and will include results of intensive hydrogeologic monitoring of the site. Once the appropriate cleanup option is identified, US EPA will implement it using federal and state resources. Past discharges to the lake have caused elevated levels of mercury in lake sediment. The elevated sediment levels may continue to pose a threat to aquatic resources. US EPA is evaluating options for addressing this

problem. Regional Board staff anticipates working closely with the Superfund Program Site Manager during development of the Clear Lake TMDL and Basin Plan Amendment.

Regional Board staff measured mercury concentrations in the Sacramento River in 1994-95 during high flows. Data from Prospect Slough suggested a potentially significant source in the Yolo Bypass. From January through April 1995 (high flow) 375 kilograms of mercury entered the Delta via the Yolo Bypass. Follow-up studies of the major inputs to the Bypass found that Cache Creek was the primary source. Mercury concentrations in Cache Creek ranged between 600 and 2,200 ng/l. The US EPA recommended criteria for mercury is 12 ng/l. High mercury levels were also detected in other Sacramento River discharges upstream of the Feather River. Follow-up monitoring was conducted by the Regional Board in Cache Creek in each subsequent year to confirm the mercury sources detected in the winter of 1994-95 and to begin to pinpoint sources in the watershed. Staff will concentrate on the Cache Creek Watershed first for designing mercury abatement plans. Information gained in Cache Creek Watershed will be used to evaluate the feasibility of doing abatement work in other watersheds that also appear to contribute elevated loads to the Delta.

Mercury concentrations were monitored in the various tributaries of Cache Creek during the 1995-96 wet season and in subsequent years to develop a mercury mass load for the watershed. Once the tributaries contributing the majority of the mercury have been identified, then follow-up work will concentrate on determining the principle sources within each tributary. Staff has completed initial screening of the tributaries and has initiated detailed mercury follow-up studies on the most significant tributary sources. A final staff report was completed in June, 1998. Results suggest that the most significant sources are the North Fork of Cache Creek, Harley Gulch, and Bear Creek. More monitoring will be needed in the next few years to fully characterize the principle sources in each tributary. Follow-up work is needed to evaluate the feasibility of abatement projects.

An underlying assumption is that the mercury in the various tributaries to Cache Creek is bioavailable. US Fish and Wildlife Service and US Geological Survey are conducting studies in the watershed that should help evaluate mercury cycling. The Regional Board has a contract with U.C. Davis to evaluate mercury bioavailability in Cache Creek. Study results match pretty closely with the load studies that have been completed. Much more work will be needed to prioritize what abatement activities are most appropriate. A survey of abandoned mines is needed to determine which sites are potentially suitable for abatement projects.

Slotton et al. (1997a) reported that concentrations of mercury in aquatic indicator organisms increased in a predictable fashion with increasing trophic feeding level. In a separate study, Slotton et al. (1997b) looked at benthic invertebrates in the upper Cache Creek basin to determine local mercury bioavailability. All invertebrate tissue samples with mercury concentrations greater than background were associated with known mercury mines or geothermal hot springs. The highly localized nature of these sites was demonstrated by the lower biotic tissue concentrations in adjacent streams without

historic mercury mining activity. Invertebrates collected in the upper mainstem of Cache Creek away from all historic mining activity had tissue concentrations comparable to similar indicator organisms obtained from mainstem Sierra Nevada River gold mining activity indicating the Coast Range mercury is at least as bioavailable as that in the Sierras. Tissue concentrations in Cache Creek decreased downstream suggesting that much of the large bulk loads of mercury observed by the Regional Board might not be very biologically available in the lower watershed.

The mercury subgroup of the Cache Creek Stakeholders Groups has been very active. Approximately 20-30 attendees include Regional Board staff, other state and federal agency scientists, mercury researchers from UC Davis and other academic institutions and stakeholders. Topics discussed by the mercury workgroup include evaluation of new data, ongoing and upcoming monitoring studies, mercury cycling, potential sources and mitigation options, human health impacts, coordination of state and federal agency research efforts in the watershed and other concerns. In August 1999, the mercury workgroup changed its name to the Sacramento-San Joaquin Delta Tributaries Mercury Council, to reflect its desire to expand its geographic scope to include mercury in the Sacramento and Mokelumne watersheds and the San Francisco Bay-Delta. CALFED recently funded a multi-investigator research program, an "Assessment of Ecological and Human Health Impacts of Mercury in the Bay-Delta Watershed". Regional Board staff and many members of the Mercury Council are involved. The Mercury Council will serve as a forum for discussion of data and draft reports. A final report to CALFED is due in December 2001. Significant amounts of technical information needed for the Cache Creek and Delta mercury TMDLs are expected to be generated through the CALFED project.

The Sacramento River Watershed Program (SRWP) has monetary resources and a workplan for addressing mercury issues in the Sacramento River Watershed. Their goal is an interest-based, stakeholder-driven effort to achieve compliance with water quality goals for mercury in the Sacramento River Watershed. The Delta Tributaries Mercury Council has become the primary forum for formulation of SRWP's mercury strategic plan. The SRWP is funding a facilitator for the Mercury Council. Tasks to be completed in the SRWP mercury plan are designed to be similar to elements needed for a mercury TMDL. Regional Board staff will assist in coordinating activities of the CALFED research program, mercury TMDL development and the Sacramento River Watershed Program's mercury efforts. Regional Board staff also provides technical review to the SRWP mercury plan documents.

The Regional Board has goals to develop and implement a mercury control strategy, satisfy requirements for the Clear Lake and Cache Creek TMDLs and ultimately reduce fish mercury tissues concentrations to levels that eliminate the need for fish consumption advisories. Research and data-gathering activities funded by CALFED and the SRWP will likely provide much of the information needed for these goals. Additional, necessary monitoring and analysis activities that have not yet been funded are the following:

*Assessment of Sources and Bioavailability.* For Clear Lake, a hydrogeologic characterization beginning in December 1999 of the Sulphur Bank Mercury Mine site is expected to provide an estimation of mercury entering the lake. Information will be lacking on the amount of mercury moving from historical lakebed deposits to the water column and bioavailability of mercury from each source. For Cache Creek, Regional Board staff time is required for continuing mercury loading and bioavailability studies. Fish tissue burden studies, also as yet unfunded, are needed to evaluate the public and wildlife risk posed by elevated mercury concentrations in the Cache Creek Watershed.

*Water Quality Target for Mercury.* Regional Board staff will be coordinating with staff from Region 2 on selection of a water quality target for mercury. Staff time is required for evaluating mercury exposure studies of humans and wildlife and preparing a target selection report. The Sacramento River Watershed Program is evaluating targets as part of its mercury strategic plan, but a final target report is scheduled to be released after the Clear Lake TMDL will be completed.

*Mercury Mass Balance in Clear Lake.* A model of mercury mass balance in Clear Lake is needed prior to calculating the amount of load reduction that would meet the water quality target and developing an implementation plan.

*Implementation Plans.* Plans need to be developed to reduce mercury tissue levels in fish in Clear Lake and the Cache Creek Watershed. Plans should include: load reduction goals for mercury from principal sources; management measures to reduce bioavailability; schedule of activities; recommendations for implementation funding; and follow-up monitoring programs.

### Gravel Extraction Activities

Regarding gravel extraction activities in the portion of the watershed between the foothills and Yolo bypass, staff proposes to continue present levels of activity. The Army Corps of Engineers issues permits for operations in the channel. For instream operations, the Department of Fish and Game issues stream alteration permits. The Regional Board comments on both of these. The Regional Board adopts permits on processing facilities. Monitoring is needed to determine the levels of mercury in ground water.

### Erosion

Private landowners have completed several erosion control projects along the creek, some of which were paid for with state and federal emergency funds. Yolo County is planning additional erosion control projects to be constructed later this year. As was discussed in a previous section, Yolo County received grant funds from the State Board through Proposition 204 for implementing erosion control programs in the watershed.

### Pesticides

There is an ongoing nonpoint source project underway in Yolo County to evaluate practices that reduce pesticide discharges to surface waters. There are projects underway in other portions of the Region that are applicable in this watershed. More studies are needed to define the possible existence and/or extent of problems.

### Unknown Toxicity

Previous monitoring has identified toxicity in some samples collected from Cache Creek. More monitoring is needed to define this toxicity and to determine the cause of toxicity. A Clean Water Act Section 205(j) project provided resources for a toxicity monitoring screening program in Cache Creek. The project is now complete. Significant fish and invertebrate toxicity was detected in samples collected from Cache Creek at the Rumsey Bridge. However, in general, few toxic events were detected throughout the Cache Creek watershed.

### Invasive Plant Species

The non-native invasive plant workgroup of the Cache Creek Stakeholders Group has held several educational forums to provide information of various methods of control of invasive species, particularly tamarisk. The Cache Creek Conservancy plans to create a demonstration project at the Cache Creek Nature Preserve to exhibit methods of tamarisk and *Arundo* removal and revegetation with native species.